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name Huronian has been applied to quite different series; by using these local names for the Temiskaming region one avoids confusion.

The Bruce series consists of quartzites, conglomerates, limestones, and greywackes. The Cobalt series contains quartzites, conglomerates, both basal and slaty, and cherty limestone. As at Cobalt, so at Bruce the Cobalt slate conglomerate carries striated bowlders.

T. T. Q.

Über die Parallelstruktur des Gletschereises. By AXEL HAMBERG. 9e Cong. Internat. d. Géog., 1908, Compte rendu II. Pp. 7, pls. 4.

In general two sorts of parallel structure are to be observed in glaciers, that due to the original snow bedding in the collecting area, and that of secondary origin which is vertical and parallel to the longitudinal axis of the glacier. By some it has been thought that the vertical parallel structure was only the original horizontal snow bedding turned up on edge through pressure. It is desirable to know whether "regenerated" glaciers show the vertical parallel structure and how it is formed. The author after a study of a number of glaciers in Sweden and Spitzbergen concludes that the structure in question has relation to the movement of the ice. When there is a downward slope in an ice sheet, the very great downward pressure of the ice from gravity has a forward component which tends to cause movement along the valley. Friction of the sides and bottom of the valley retards the motion of ice layers next to them, so that the ice is broken into parallel bands which move forward at differential rates, the upper central bands moving the more rapidly. The planes of differential motion are influenced by every irregularity of the containing valley and may be trough-shaped.

R. C. M.

The Grain of Igneous Rocks. By A. C. LANE. Ann. Rept., Board Geol. and Biol. Surv., Michigan (1911), pp. 145–71. Figs. 5.

The grain of an igneous rock depends on a number of factors, among which may be noted the chemical and mineralogical composition of the rock, its retention of solvent gases and mineralizers, pressure, and rate of cooling. The last named is one of the most important, and it is observed that there is a direct ratio between the size of the grain and distance from the cooling surface, the effect being most advantageously studied in the mineral grains which are last to crystallize. With due

consideration of certain variable factors, such as the power of crystallization of the magma, diffusivity of heat, production and absorption of latent heat, and undercooling, it is possible to make mathematical determination of the size of grain that should form at a given distance from the cooling surface. Gradual change in the temperature of the margin is one of the factors most difficult to estimate. It seems obvious that the margins of certain even-grained dikes were near the temperature of the magma at the time of crystallization.

R. C. M.

Temperature of the Copper Mines. By A. C. LANE. Ann. Rept., Board Geol. and Biol. Surv., Michigan (1911), pp. 757–73, Fig. 1.

The temperature at various depths in the copper mines is of practical interest because of its importance in determining to what extent men may work with efficiency, and of scientific interest because of its relation to the circulation of mine waters and possibly to the formation of native copper, as indicated by the result of recent experimentation. The mean annual surface temperature in the copper region is about 39° F., that in the upper levels of the mine at the depth of "no variation" between 43° and 44° F. Careful measurements of the rate of increase of temperature downward have been recently made which give an average of 1° F. for 105 feet descent, or in certain cases as low as 1° in 111 feet. This rate is below the normal and may be due to a number of causes. The more important factors are thought to be (1) endothermal reactions connected with the deposition of copper, (2) the high diffusivity of the strata, permitting the free escape of heat, (3) downward absorption of water carrying the cooler surface temperatures, and (4) relative exhaustion of the internal supply of heat by the Keweenawan and earlier eruptions.

R. C. M.